



FACT SHEET

Radioisotope Brief: Plutonium-239 (Pu-239)

Half-life

24,400 years

Mode of decay

Alpha particles

Chemical properties

Solid under normal conditions. Can form compounds with other elements.

What is it used for?

Pu-239 is used primarily in nuclear weapons development and research. Pu-239 also is used in space probes and satellites to keep electronic components warm and in nuclear power generators that produce energy on satellites and space probes.

Alpha Particles are subatomic particles made up of two neutrons and two protons ejected from the nucleus of an unstable atom. They are not able to penetrate most materials—even a piece of paper or the outer layer of human skin can block an alpha particle. However, alpha particles are particularly dangerous to humans when they are inhaled because they will kill lung cells, which could lead to scarring and possible cancer.

Where does it come from?

Pu-239 is produced by fission and is a byproduct of nuclear weapons production and nuclear power operations.

What form is it in?

Pu-239 is a solid material that is fashioned into rods for use in nuclear reactors and into ceramic “buttons” for use in satellite systems.

What does it look like?

Pu-239 is a silvery-gray metal that becomes yellowish when exposed to air. Most Pu-239 in the environment is in the form of microscopic particles that are the remnants of nuclear weapons testing and nuclear reactor accidents.

How can it hurt me?

Because it emits alpha particles, Pu-239 is most dangerous when it is inhaled. When Pu-239 particles are inhaled, they lodge in lung tissue. The alpha particles can kill lung cells, which causes scarring of the lungs, leading to further lung disease and cancer. Pu-239 can enter the blood stream from the lungs and travel to the kidneys, meaning that the blood and the kidneys will be exposed to the alpha particles. Once Pu-239 circulates through the body, it concentrates in the bones, liver, and spleen, exposing these organs. Pu-239 ingested in contaminated food or water does not pose a serious threat to humans because the stomach does not absorb plutonium easily and so it passes out of the body in the feces.

For more information about Pu-239, see the Public Health Statement by the Agency for Toxic Substances and Disease Registry at: <http://www.atsdr.cdc.gov/toxprofiles>, or visit the Environmental Protection Agency at <http://www.epa.gov/radiation/radionuclides/plutonium.htm>.

Radioisotope Brief: Plutonium-239 (Pu-239)

(continued from previous page)

For more information about health effects related to uranium exposure, see CDC's fact sheet on "Radiation and Health Effects," at <http://www.bt.cdc.gov/radiation/healthfacts.asp>.

For more information on protecting yourself before or during a radiologic emergency, see CDC's fact sheet titled "Frequently Asked Questions (FAQs) About a Radiation Emergency" at <http://www.bt.cdc.gov/radiation/emergencyfaq.asp>, and "Sheltering in Place During a Radiation Emergency," at <http://www.bt.cdc.gov/radiation/shelter.asp>.

The Centers for Disease Control and Prevention (CDC) protects people's health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations.

For more information, visit www.bt.cdc.gov/radiation, or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)

May 21, 2003

Page 2 of 2